

What is claimed is:

1. A slurry composition for chemical and mechanical polishing comprising:
a dispersion comprising an abrasive; and
5 an oxidizer;
wherein said dispersion has a large particle count of less than about 150,000
particles having a particle size of greater than about 0.5 μm in a 30 μL sample.
2. The composition of claim 1, wherein said dispersion is selected from the group
10 consisting of: fumed silica, colloidal silica, alumina, ceria, and mixtures thereof.
3. The composition of claim 2, wherein said dispersion is a fumed silica dispersion.
4. The composition of claim 3, wherein said fumed silica dispersion is between
15 about 6 wt.% to 8 wt. % fumed silica.
5. The composition of claim 1, wherein said oxidizer is selected from the group
consisting of: hydrogen peroxide, potassium ferricyanide, potassium dichromate,
potassium iodate, potassium bromate, vanadium trioxide, hypochlorous acid,
20 sodium hypochlorite, potassium hypochlorite, calcium hypochlorite, magnesium
hypochlorite, ferric nitrate, various ammonium salts such as ammonium
persulfate, potassium permanganate, and mixtures thereof.
6. The composition of claim 5, wherein said oxidizer is present in an amount
25 between about 0.05% to 10% of the total weight of the slurry composition.
7. The composition of claim 5, wherein said oxidizer is hydrogen peroxide.

8. The composition of claim 7, wherein said hydrogen peroxide is present in an amount between about 0.05 % to 0.50 % of the total weight of the slurry composition.
- 5 9. The composition of claim 1, further comprising a corrosion inhibitor.
10. The composition of claim 9, wherein said corrosion inhibitor is selected from the group consisting of: benzotriazole, 6-tolylytriazole, 1-(2,3,dicarboxypropyl)benzotriazole, carboxylic acids, and mixtures thereof.
- 10 11. The composition of claim 10, wherein said corrosion inhibitor is present in amount between about 0.003% to 0.10% of the total weight of the slurry composition.
- 15 12. The composition of claim 10, wherein said corrosion inhibitor is benzotriazole.
13. The composition of claim 12, wherein said benzotriazole is present in an amount between about 0.005 % to 0.015 % of the total weight of the slurry composition.
- 20 14. The composition of claim 1, further comprising a chemical activity enhancer, which increases the copper removal rate.
15. The composition of claim 14, wherein said chemical activity enhancer is an amine, which is selected from the group consisting of: ammonia, hydroxylamine, 25 monoethanolamine, diethanolamine, triethanolamine, diethyleneglycolamine, N-hydroxyethylpiperazine, and mixtures thereof.
16. The composition of claim 15, wherein said amine is present in an amount between about 0.005% to 10% of the total weight of the slurry composition.

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17. The composition of claim 15, wherein said chemical activity enhancer is ammonia.
18. The composition of claim 17, wherein said ammonia is present in an amount
5 between about 0.01 % to 0.03 % of the total weight of the slurry composition.
19. The composition of claim 1, further comprising a pH adjuster.
20. The composition of claim 10, wherein said pH adjuster is selected from the group
10 consisting of: formic acid, acetic acid, propanoic acid, butanoic acid, pentanoic acid, hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid, lactic acid, hydrochloric acid, nitric acid, phosphoric acid, sulfuric acid, hydrofluoric acid, malic acid, tartaric acid, gluconic acid, citric acid, phthalic acid, pyrocatechoic acid, pyrogallol carboxylic acid, gallic acid, tannic acid and mixtures thereof.
21. The composition of claim 20, wherein said pH adjuster is present in an amount
15 between about 0.10 % to 2% of the total weight of the slurry.
22. The composition of claim 20, wherein said pH adjuster is propanoic acid.
23. The composition of claim 22, wherein said propanoic acid is present in an amount
20 between about 0.20% to 0.50% of the total weight of the slurry composition.
24. The composition of claim 1, wherein said slurry composition has a pH between
25 about 8 to 10.5.
25. The composition of claim 1, further comprising at least one additional chemical component selected from the group consisting of: stabilizing agents, surfactants, fluorine-containing compounds, chelating agents, salts, and mixtures thereof.
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26. A slurry composition for the chemical mechanical polishing of metal layers, the composition comprising:

- (a) a silica dispersion;
- (b) an oxidizer;
- 5 (c) a chemical activity enhancer;
- (d) a pH adjuster; and
- (e) a corrosion inhibitor,

wherein said silica dispersion has a large particle count of less than about 150,000 particles having a particle size greater than about 0.5 μ m in a 30 μ L sample.

10 27. A method of preparing a chemical mechanical polishing slurry composition, comprising the steps of:

- (a) admixing a chemical mechanical polishing slurry composition comprising:
a silica dispersion and an oxidizer; and
- 15 (b) filtering said chemical mechanical polishing slurry composition such that the large particle count in said composition is less than about 150,000 particles having a particle size greater than about 0.5 μ m in about 30 μ L of sample.

20 28. The method of claim 27, wherein said slurry composition is filtered at least once prior to its use.

29. The method of claim 28, wherein said slurry composition is filtered at least three times prior to its use.

25 30. A method of reducing defects on a metal layer, comprising the steps of:

- (a) applying to a metal layer a slurry composition comprising a silica dispersion and an oxidizer, wherein said silica dispersion has a large particle count of less than about 150,000 particles having a particle size of
30 greater than about 0.5 μ m in a 30 μ L sample; and

(b) chemically mechanically polishing said metal layer with said slurry composition.

31. The method of claim 30, wherein said metal layer is selected from the group
5 consisting of: copper, tungsten, tantalum, aluminum, titanium, and combinations thereof.